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Dated 26 May 1999

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06 MAY 1998

The Patent Office  
Cardiff Road  
Newport  
Gwent NP9 1RH

**1. Your reference**

GPS.JBJ.Misc/42550/000

**2. Patent application number**

(The Patent Office will fill in this part)

9809640.7

**3. Full name, address and postcode of the or of each applicant (underline all surnames)**

MERITOR LIGHT VEHICLE SYSTEMS (UK) LIMITED  
FORDHOUSE LANE  
STIRCHLEY  
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B30 3BW

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

**4. Title of the invention**

LATCH MECHANISM

**5. Name of your agent (if you have one)**

WITHERS &amp; ROGERS

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

~~4 DYER'S BUILDINGS~~  
HOLBORN  
LONDON  
EC1N 2JT

Goldings Buildings  
2 May Lane  
LONDON  
SE1 2HW

Patents ADP number (if you know it)

00 0017 66 001

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Country

Priority application number  
(if you know it)Date of filing  
(day / month / year)**7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application**

Number of earlier application

Date of filing  
(day / month / year)**8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:**

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

See note (d))

YES

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Continuation sheets of this form /  
Description 10  
Claim(s) / *(N)*  
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Statement of inventorship and right to grant of a patent (Patents Form 7/77) /  
Request for preliminary examination and search (Patents Form 9/77) /  
Request for substantive examination (Patents Form 10/77) /  
Any other documents (please specify) /

11.

I/We request the grant of a patent on the basis of this application.

Signature *Withey Rogers* Date 06.05.98  
WITHERS & ROGERS

12. Name and daytime telephone number of person to contact in the United Kingdom

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LATCH MECHANISM

The present invention relates to latch mechanisms for doors of vehicles.

The invention further relates to vehicles including at least 2 doors, each door incorporating a latch mechanism.

It is known to provide latch mechanisms on doors of vehicles to allow opening and closing of the door. Such latch mechanisms have various modes of operation eg

- a) Lock mode, wherein operation of an outside door handle does not open the latch mechanism
- b) Supper locked mode, when in operation of an outside or an inside release lever does not operate the latch mechanism.
- c) Child safety mode, wherein operation of an inside release lever does not open the latch mechanism, whether or not the latch mechanism is locked, and
- d) Release mode, wherein the latch mechanism is released via means other than operation of the inside or outside release levers.

Each mode has alternate states eg locked/unlocked, superlocked/not superlocked, child safety on/off and release/not released.

Typically each mode requires an individual mechanism to effect the alternative states, with operation of each mechanism being affected either manually or with an individual power actuator.

In the case of a latch mechanism operated entirely by power actuators, such as DC motors, it is also necessary to be able to open a locked door which has the child safety feature on in an emergency situation when actuation of the power actuators is not possible, such as when the keys to the vehicle are not available.

Thus according to the present invention there is provided a latch mechanism including a housing, a pawl rotatably mounted on the housing to release the latch, a pawl lifter rotationally fast with the pawl, an inside and an outside release means, an inside and an outside lock-link mounted on the pawl lifter with each lock link being moveable from a first position, where operation of the associated release means causes rotation of the pawl to release the latch, to a second position, where operation of the associated release means does not cause rotation of the pawl.

According to a further aspect of the invention there is also provided a latch mechanism including a housing, a pawl rotatably mounted on the housing to release the latch, an inside and an outside release means, an inside and an

outside lock link, each lock link being moveable from a first position, where operation of the associated release means causes the lock link to rotate the pawl to release the latch, to a second position, where operation of the associated release means does not cause rotation of the pawl, wherein movement of the inside and outside lock links between the respective first and second positions is effected by a rotating cam.

Preferably the cam is driven by a power actuator.

According to a further aspect of the invention there is provided a latch mechanism having a set of operating modes, each mode having alternate states, the set including at least two of a lock mode, a super-lock mode, a child safety mode and a release mode, changing of the latch mechanisms between alternate states of the modes of the set being effected by a single power actuator.

According to a further aspect of the invention there is provided a vehicle including a first and second door, each door including respective first and second latch mechanisms, the first and second latch mechanisms being the same, and being operable by respective first and second power actuators to give respective first and second sets of operating modes each mode having alternate states, control of the power actuators being different to provide for different first and second sets of operating modes.

It is an object of the present invention to provide a latch mechanism which is simpler and more economical to produce and which reduces the need for linkage arrangements associated with the various modes of operation of known latch mechanisms.

The invention will now be described by way of example only with reference to the accompanying drawings in which;

Fig.1 is a latch mechanism according to the present invention in a super-locked condition;

Fig.1a is an enlarged view of part of Fig.1;

Fig.1b is a schematic view in the direction of arrow A of Fig.1;

Fig.2 is the latch mechanism of Fig.1 in a locked position with child safety on;

Fig.3 is the latch mechanism of Fig.1 in an unlocked condition with the child safety on;

Fig.4 is the latch mechanism of Fig.1 in a locked condition with the child safety off;

Fig.5 is the latch mechanism of Fig.1 in an unlocked position with the child safety off; and

Fig.6 is a latch mechanism of Fig.1 in a release position.

With reference to Figs 1-6 there is shown a latch mechanism 10 including a body 11 which supports various components of the latch mechanism 10 as indicated below.

Latch mechanism 10 further includes a claw 12 pivotally mounted about axis 13 on the body 11. Claw 12 acts to secure an associated door (not shown) in a closed position via a striker pin 14 attached to the door aperture. Rotation of the claw 12 in an anti-clockwise direction about axis 13 when viewing Fig.1 allows release of the striker pin 14, thus enabling opening of the associated door.

The claw 12 is held in a closed position by a pawl 15, only part of which is shown in dotted profile in Fig.1 for clarity. Pawl 15 is pivotally mounted on body 11 and can rotate about axis 16. Claw 12 can be held in a first safety position (not shown) when pawl 15 engages first safety abutment 17.

Pawl lifter 20 is generally flat and lies in a plane parallel to pawl 15, to which it is rotationally secured. When viewing Fig.1 pawl 15 is obscured by pawl lifter 20. Clearly, pawl lifter 20 also rotates about axis 16.

Inside lock link 21 and outside lock link 22 are each individually pivoted about respective axes 21a and 22a on pawl lifter 20. In this case inside lock link 21 and outside lock link 22 are identical and each have respective cam followers 21b and 22b and release abutments 21c and 22c. Inside lock link 21 and outside lock link 22 are each biased in a clockwise direction when viewing Fig.1 such that the respective cam followers 21b and 22b contact cam 30.

Cam 30 is capable of rotating independently from pawl lifter 20 about axis 16. Cam 30 has three lobes 31, 32 and 33 and two levers 34, and 35 shown diagrammatically for clarity. Lobes 31, 32, 33 and levers 34 and 35 are all rotationally fast with cam 30. Preferably cam 30 can at least be rotated to the various positions as described below by a power actuator (not shown) such as a DC motor or preferably a stepper motor.

Outside release lever 40 is pivotedly mounted about axis 41. Inside release lever 43 (shown diagrammatically in Fig.1b) is pivotedly mounted about axis 44.

Operation of a door latch mechanism is as follows.

Fig.1 shows the door latch mechanism in a super lock condition, that is to say operation of the outside release lever 40 or inside release lever 43 does not allow unlatching of the mechanism. In particular it can be seen that if outside release lever 40 were to be operated by being rotated in a clockwise direction about axis 41, abutment 42 would pass release abutment 22c of outside lock link 22 without contact (note that outside release lever 40 is in the same plane as outside lock link 22). Similarly inside release lever 43 when operated by being rotated in an anti-clockwise direction about axis 44 when viewing Fig.1b, would cause abutment 45 to pass release abutment 21c of inside lock link 21 (see especially Fig.1).

Fig.2 shows the door latch mechanism 10 in a locked position with the child safety feature on. It will be noted that cam 30 has been rotated 30 degrees in an anti-clockwise direction when compared to Fig.1. However, the inside lock link 21 and outside lock link 22 are in the same position when compared with Fig.1 since neither of the cam followers 21b or 22b have, at this stage, ridden up any of the lobes 31, 32 or 33 of the cam 30. However, lever 34 has been rotated to a position whereby operation of the inside release lever 43 in an anti-clockwise direction when viewing Fig.1b would cause abutment 46 to contact lever 34 and rotate cam 30 to the position shown in Fig.3. Note this initial operation of inside release lever 43 does not unlatch the mechanism but only operates to unlock the door (see below). This method

of being able to over-ride and open a locked door which has the child safety on is especially important in an emergency situation whereby a passer-by can effect access to the inside door handle (eg by breaking the door window glass), operate the inside door handle to unlock the door, then operate the outside door handle to open the door and then remove the child from the car.

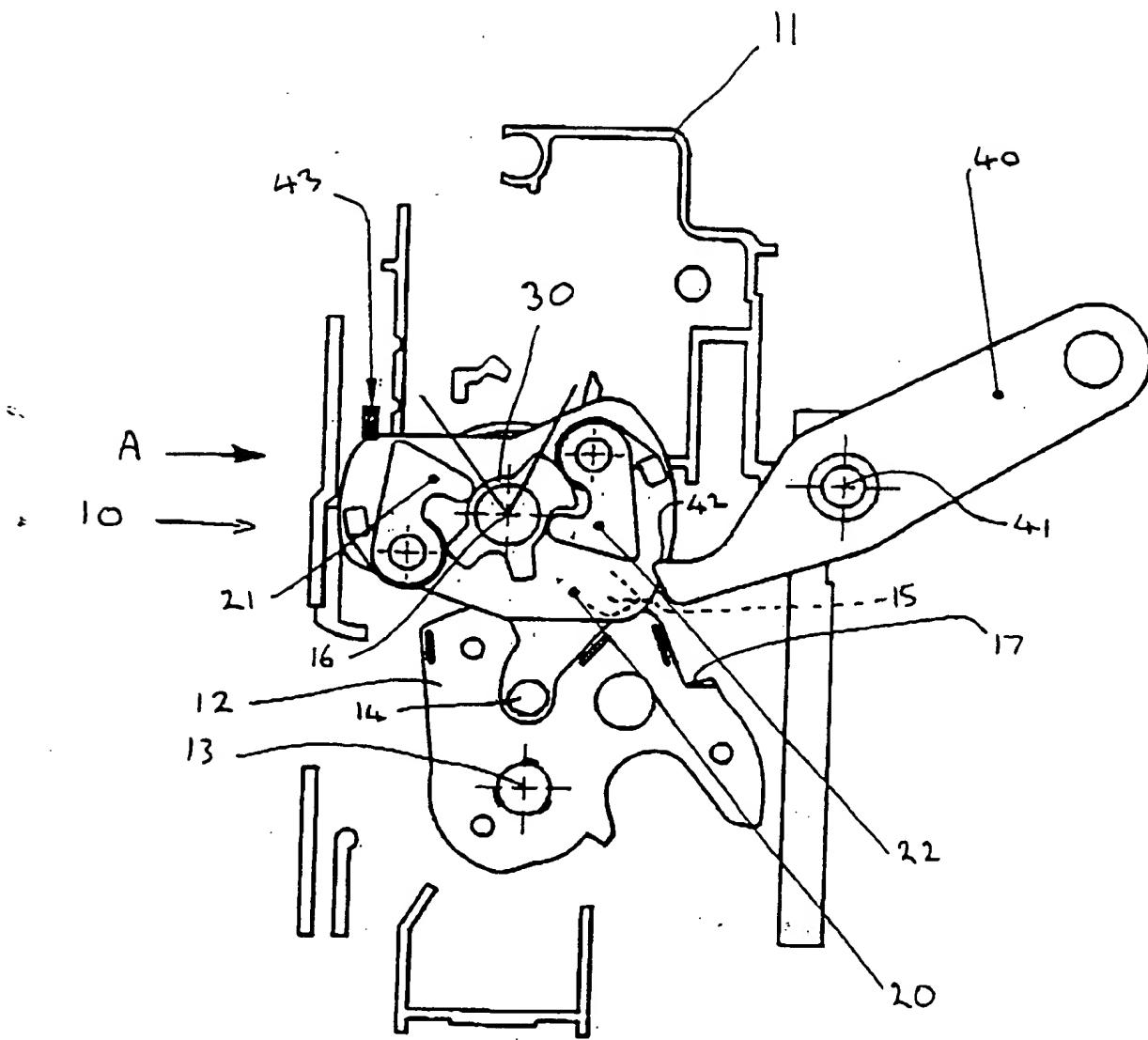
Fig.3 shows the door latch mechanism 10 in an unlocked condition with the child safety feature on. In this case the cam 30 has been rotated sufficiently (either by operating the inside release lever when the cam was in the position shown in Fig.2 or by independent rotation of the cam directly eg by a power actuator) such that cam follower 22b has ridden up cam lobe 32 resulting in anti-clockwise rotation of outside lock link 22. Thus when outside release lever 40 is operated, abutment 42 contacts release abutment 22c causing the pawl lifter 20 as a whole to rotate anti-clockwise when viewing Fig.3 and releasing the pawl 15 and allowing the claw 12 to open. Stop 22d limits the anti-clockwise rotation of outside lock link 22. Upon release of the outside release lever 40 the pawl lifter 20 is biased back to the position as shown in Fig.3 by a spring (not shown). It should also be noted that the inside lock link 21 is in the same position as that shown in Fig.1, thus operation of the inside release lever 43 does not allow opening of the door.

Fig.4 shows the door latch mechanism 10 in a locked condition with the child safety feature off. It should be noted that the cam 30 has been rotated 90 degrees in an anti-clockwise direction when compared with Fig.1. This results in cam follower 22b being situated between cam lobes 32 and 33 thus ensuring that operation of outside release lever 40 does not release the latch mechanism. Furthermore, the rotation of the cam 30 has caused cam follower 21b to ride up cam lobe 31 causing inside lock link 21 to rotate anti-clockwise about axis 21a. Thus abutment 21c of inside lock link 21 is contacted by abutment 45 of inside release lever 43 when it is operated. This causes anti-clockwise rotation of the pall lifter 20 about axis 16 resulting in unlatching of the door mechanism and allowing the door to be subsequently opened. Stop 21d limits the anti-clockwise rotation of inside lock link 21. It should be noted that the operation of the inside release lever 43 also causes abutment 46 to contact lever 35 causing rotation of cam 30 to the position shown in Fig.5. This prevents a vehicle occupant inadvertently locking himself out of the vehicle since opening of the door from the inside automatically unlocks the door, allowing subsequent opening from the outside.

Fig.5 shows the door latch mechanism 10 in an unlocked position with the child safety feature off. It can be seen that the cam has been rotated (either by operating the inside release lever when the cam was in the position shown in Fig.4 or by independent rotation of the cam directly eg by a power

actuator) such that abutment 22b now rests on lobe 33 allowing operation of the outside release lever 40 to unlatch the latch mechanism as described above. Furthermore abutment 21b remains in contact with lobe 31 thus ensuring that operation of the inside release lever also unlatches the door mechanism.

Fig.6 shows the door latch mechanism 10 in a released position. This is achieved by rotation of cam 30 in a anti-clockwise direction which allows contact between corresponding lost motion abutments (not shown) on the pawl lifter 20 and cam 30. Such lost motion abutments allow the cam 30 to rotate the pawl lifter 20 to release the door latch mechanism independently of the operation of the outside release lever 40 or the inside release lever 43.



SUPER LOCKED

FIG 1

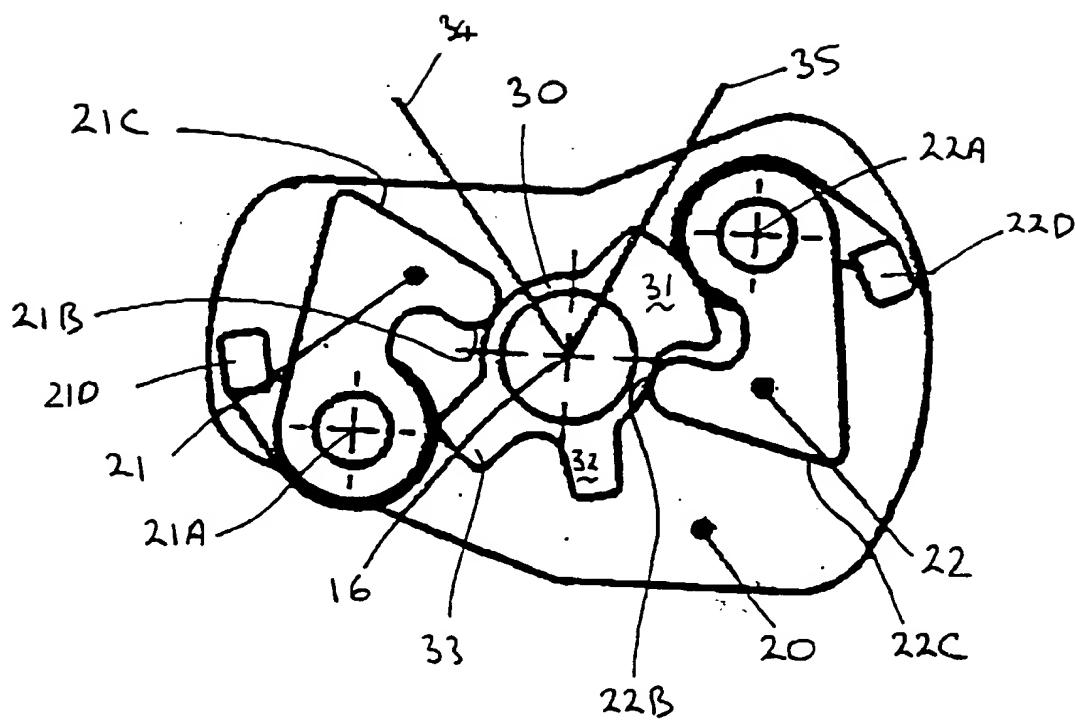


FIG 1A.

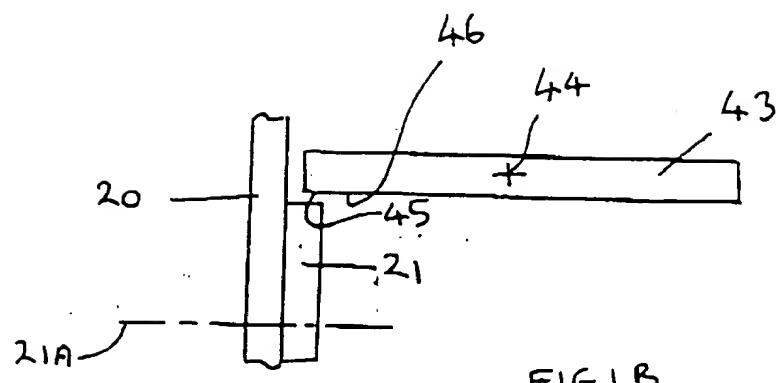
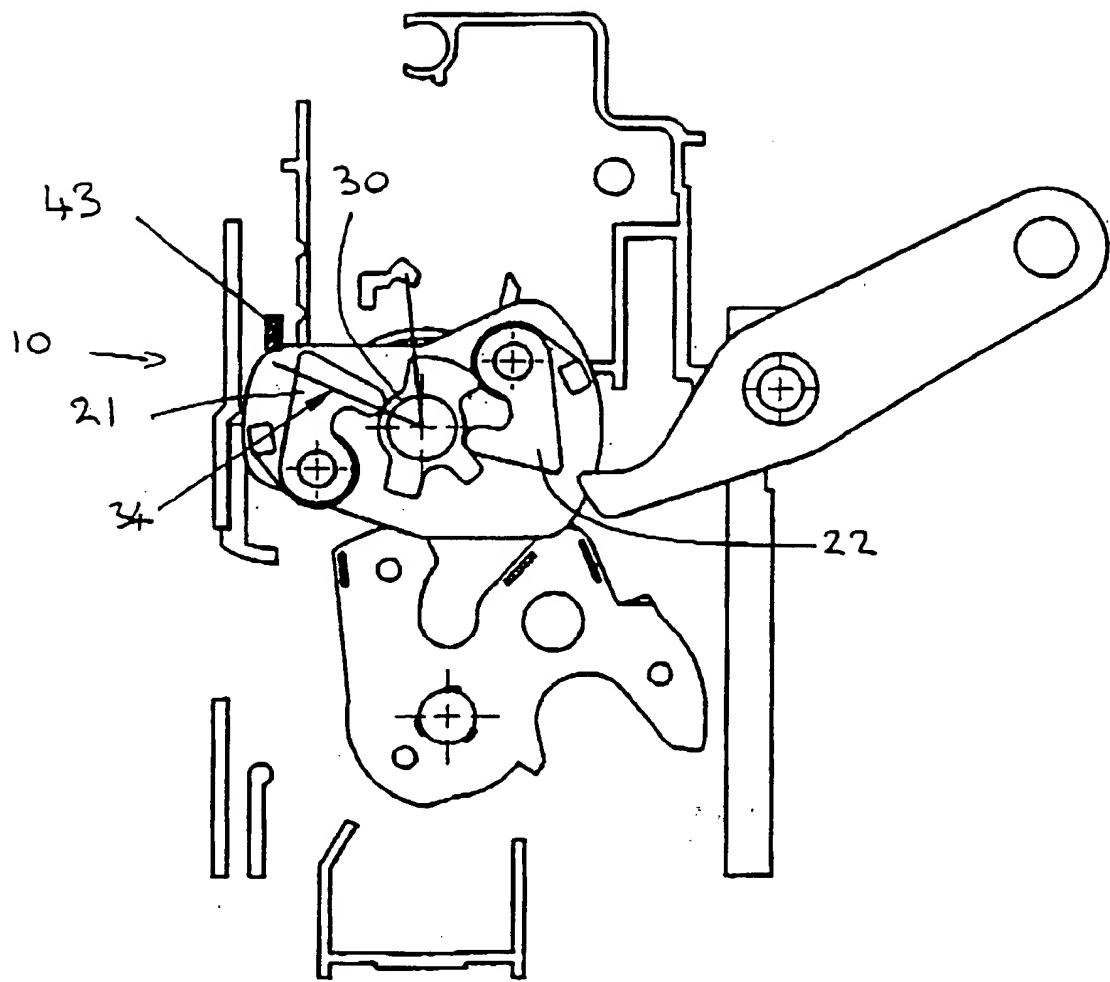
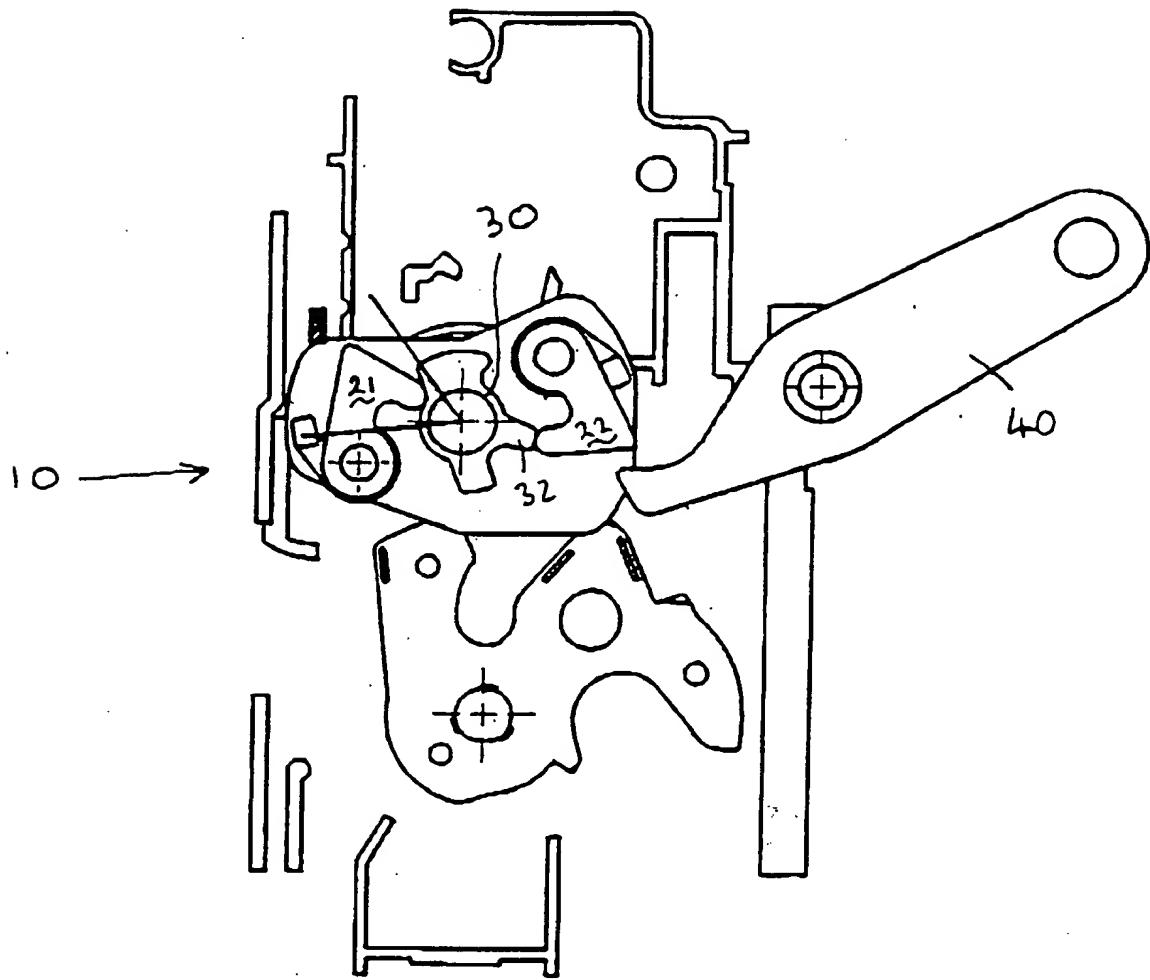


FIG 1B



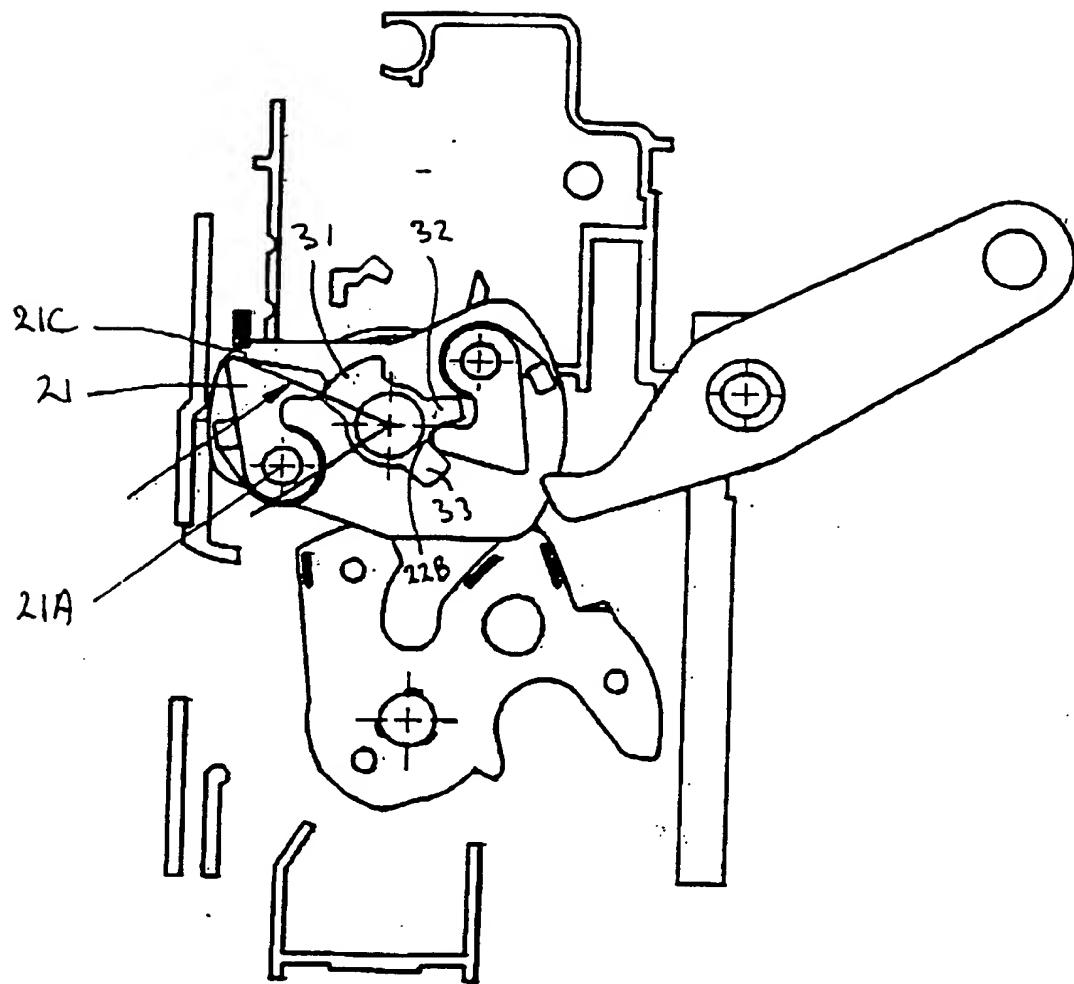
LOCKED - CHILD SAFETY ON

FIG 2



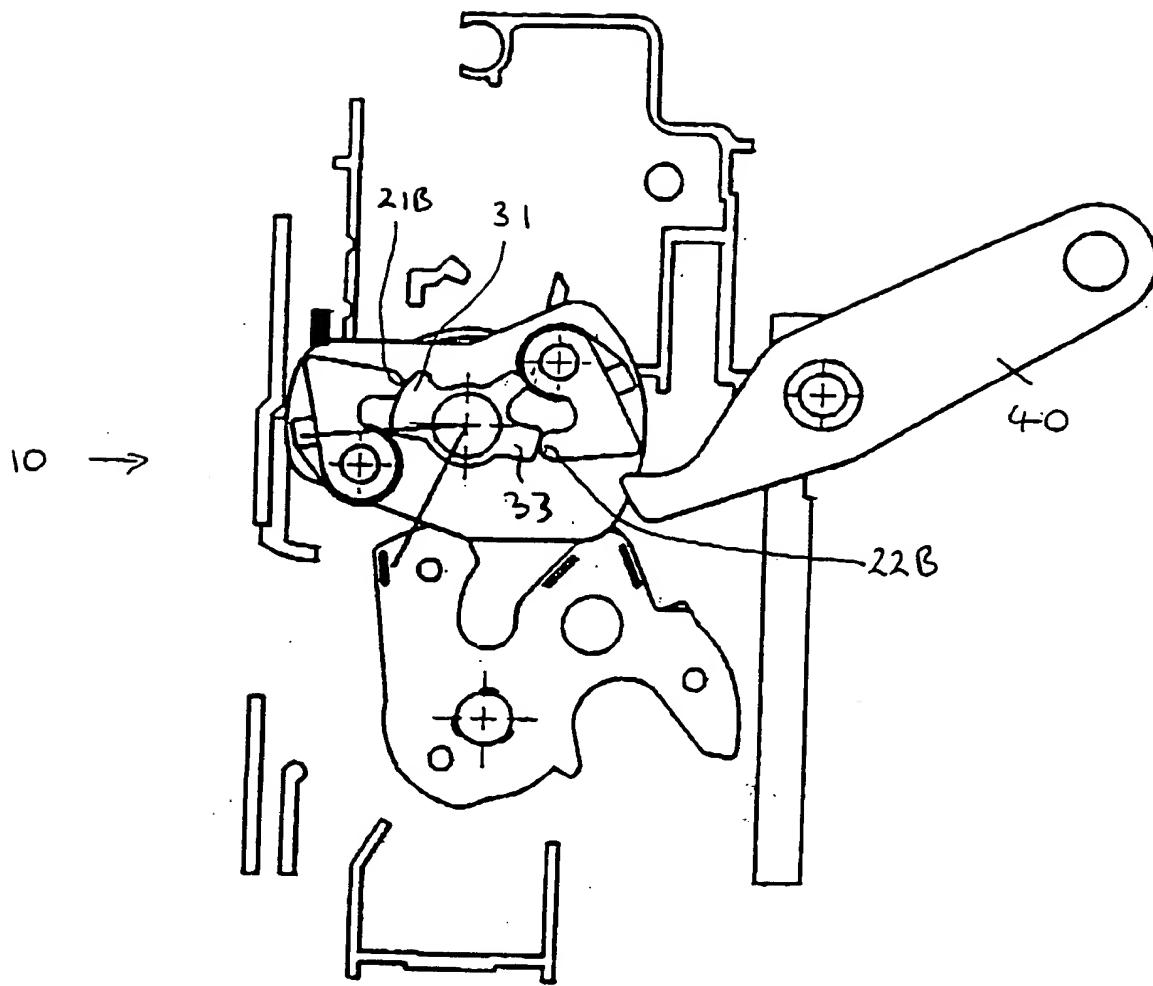
UNLOCKED - CHILD SAFETY ON

FIG 3



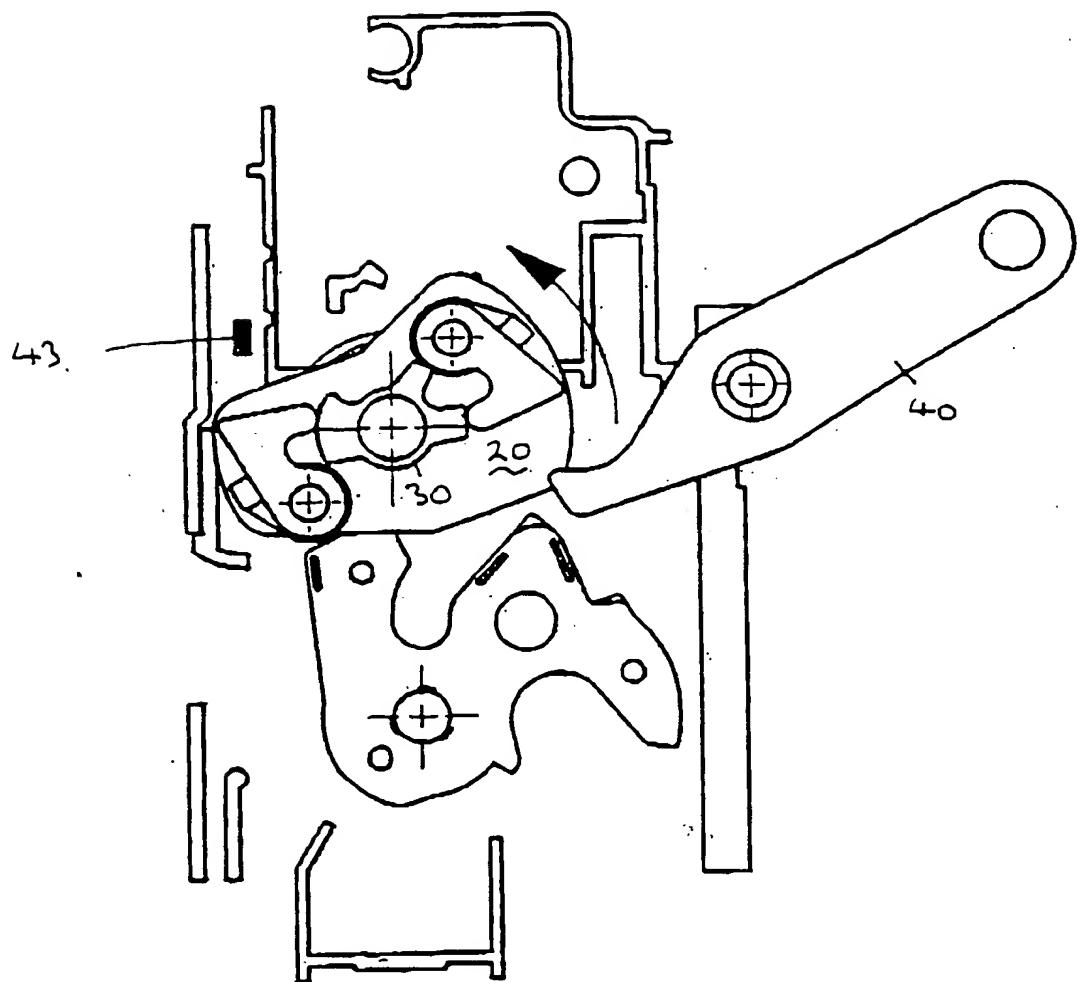
LOCKED CHILD SAFETY OFF

FIG 4.



UNLOCKED CHILD SAFETY OFF

FIG 5



RELEASE

FIG 6.